NASA'S MISSION TO PLANET EARTH

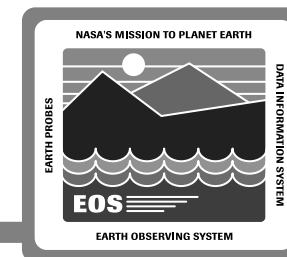EARTH PROBES

DATA INFORMATION SYSTEM

EOS

EARTH OBSERVING SYSTEM

Data Server Subsystem
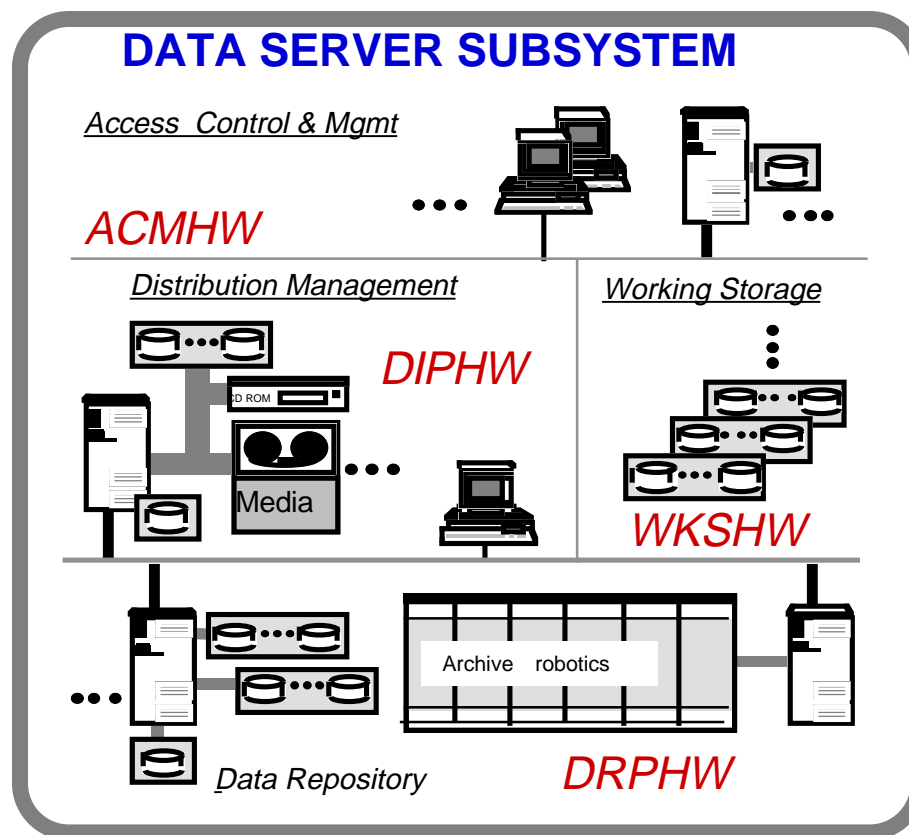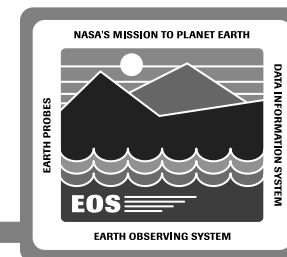# System/Hardware Implementation
Mark Huber

14 February 1995
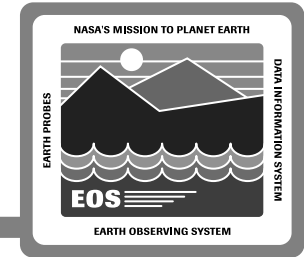
System/Hardware Implementation Activities to Date

	Objective	Document	Results
Network Attached Storage (NAS) Study	Explore the ramifications at the device, operating system, application, and subsystem level of implementing NAS.	**NAS Technology Study**	Vendor RFI (Request for Information) on NAS. Recommendations for prototyping. NAS requirements.
NAS RFI	Present to the vendor community the NAS problem and our requirements, and solicit product/prototyping information.	**NAS Vendor RFI**	Confirmation on COTS implementations. Possible prototyping agreements.
MR-AFS Proof of Concept (PCON)	Prototype of the Pittsburgh Super Computer (PSC) AFS Multi-Resident Extensions	**MR-AFS PCON Plan and Final Report**	Demonstrated a potentially viable solution for DSS local disk pooling.
Compression Study	Testing and analysis of various compression approaches on earth science data within the ECS system	**Data Compression Study for the ECS Project**	Recommendation for homogeneous, Archive limited compression at the device level
Permanent Data Storage Technologies	Recommend physical and logical approaches for storing the heterogeneous ECS data	**Permanent Data Storage Technologies Study**	Study ongoing based on better refinement of ECS data content and formats

Data Server Subsystem Subsystem Diagram

DATA SERVER SUBSYSTEM

Access Control & Mgmt

ACMHW

Distribution Management

DIPHW

CD ROM

Media

Working Storage

WKSHW

Archive   robotics

Data Repository

DRPHW

Data Server Subsystem
Access Control and Management

- **Administration Stations (AS)**
  - **Logical Data Server Administration and Configuration**
  - **Archive/Data Base Administration**

- **Access/Process Coordinators (APCs)**
  - **Access (Service) Point for External Clients**
  - **Supports Session Management**
  - **Directs Service Requests to Appropriate DSS components**
  - **Supports Electronic Distributions (Push/Pull)**
 - **Provides Compute Resources (Configurable)**

Data Server Subsystem
## Distribution and Ingest Peripheral Management
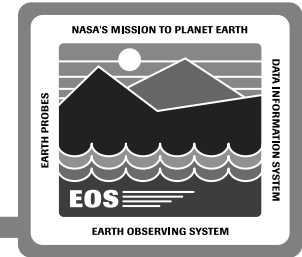
- **Ingest/Distribution Staging Disks (Buffering)**
  - **Electronic Distribution Data from Data Repositories**
  - **Physical Distribution Data from Data Repositories**
  - **Physical Ingest Data from Ingest Peripherals**

- **Ingest/Distribution Peripherals**
  - **Hard Media Readers/Writers**
  - **Support Hard Media Ingest Clients in DSS**

Ⓐ - **HSM Host (If Required)**
  - **Virtualize Staging Disks into 2nd Tier Tapes**
  - **Allows for Longer/More "Pull" Residencies**
  - **Support for Remote Mount Access to Data**

Data Server Subsystem
Data Repository
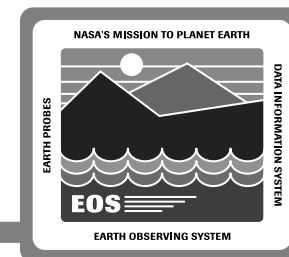
- **File Server Host**
  - **FSMS Host/Permanent Archive Manager**
  - **Large Storage Archive Device Control (i.e., tapes)**
  - **Data Routing and Resource Control**
  - **File/Large Data Based Storage**
- **Data Base Repository**
  - **DBMS Host/Permanent Archive Manager**
  - **Record/Small Data Based Storage**
- **Data Repository Robotics**
  - **Automated Media Handlers**
- **Volume Server Host**
  - **General Robotic Control for All File Servers**

Data Server Subsystem
Working Storage
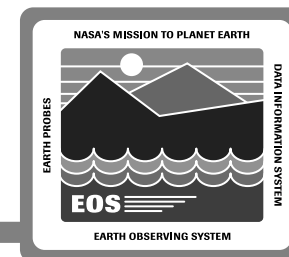
- **Primary Tier**
  - **Large Disk Pools (RAID)**
  - **High Speed Random Access**
  - **Initial "Landing Point" for all Incoming Data**
  - **Primary Location for Processing Subsystem Data Access**

- Ⓐ **Secondary Tier**
  - **Robotic Based Secondary Storage**
  - **Relatively High Speed, Sequential Access**
  - **Storage for Temporary Data**
  - **Storage for Data with Known Upcoming Access Pattern**
  - **Reduces Access on Data Repository Layer for Predictive Data Access**
  - **Use of Data Retrieval Profile (DRP) and Intelligent Purging**

Data Server Subsystem Scalability
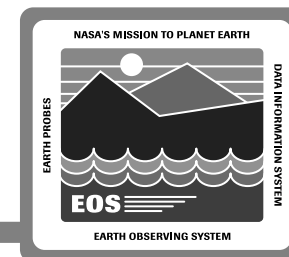
- **Segmentation of Architecture Allows Selective Increases in Paths That Become Bottlenecks**

- **Tiering of Inflow and Outflow Paths Allows for Virtualizing Resources**

- **NAS Concepts Enable Disk "Pools" to be Enlarged, thereby Benefiting More Than One Need**

- **Horizontal Scaling More Efficient Than Vertical (i.e., more, not bigger)**
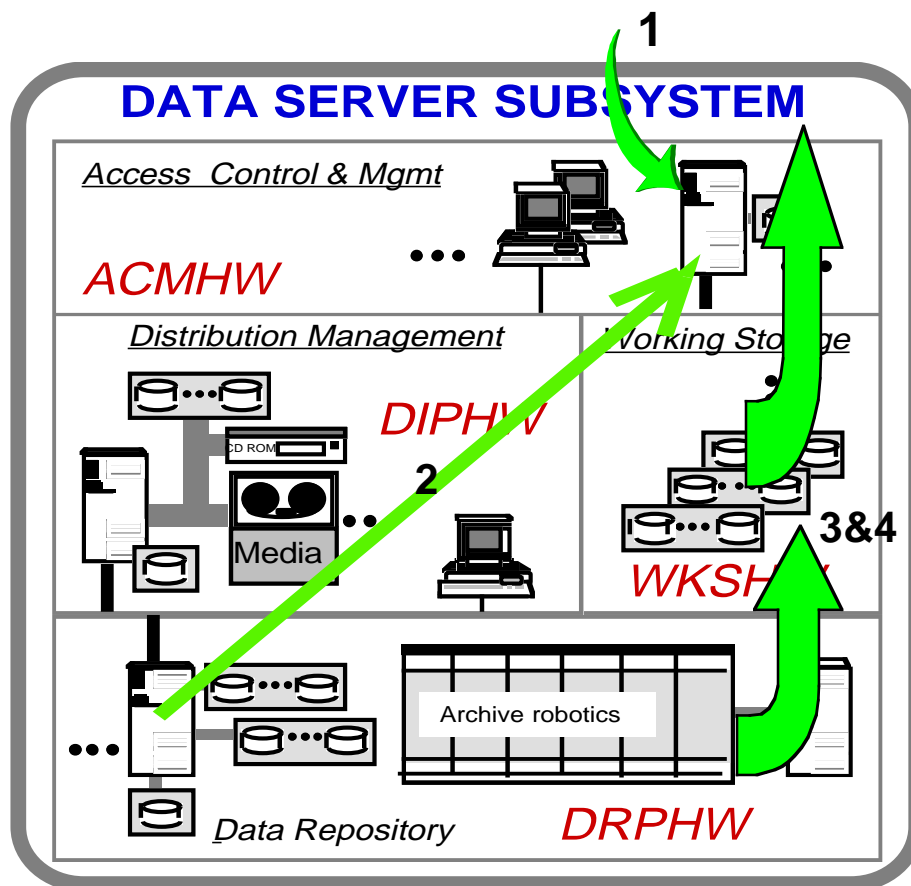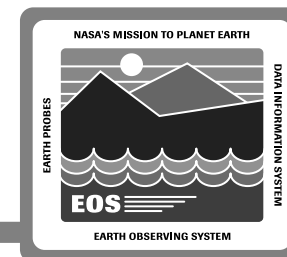
Data Server Subsystem Evolvability
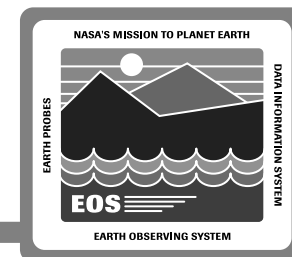
- Segmentation of Architecture Allows for Technology Insertion with Minimal System Disruption

- Data Can Migrate Into New Storage Technologies, Techniques, and Locations Without the User Being Aware

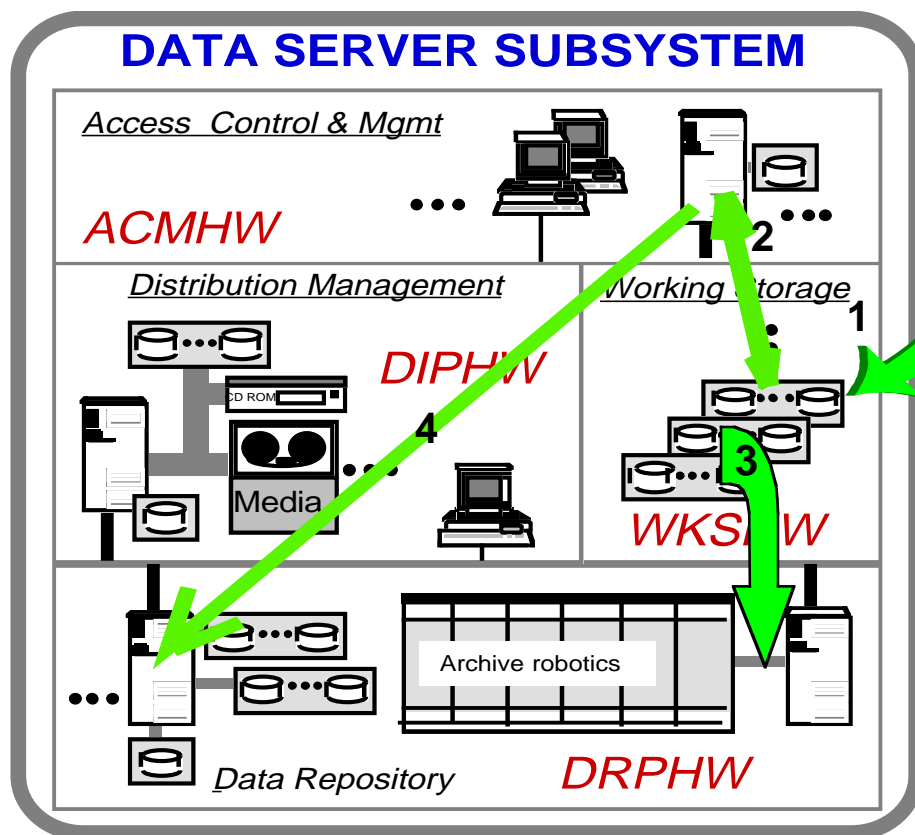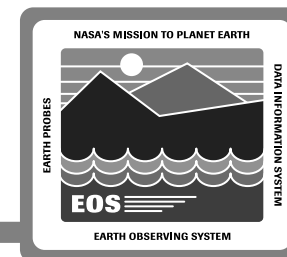- Creation of New Logical Data Servers Allow for Data to be Related in New Ways

Data Server Subsystem
System Scenario

DATA SERVER SUBSYSTEM

Access Control & Mgmt

ACMHW

Distribution Management

DIPHW

CD ROM

Media

Working Storage

WKSHW

Archive robotics

Data Repository

DRPHW

1
2
3&4

Typical User Session

1   **Access**

2   **Search**

3   **Browse**

4   **Electronic Acquire (Pull)**

Data Server Subsystem
System Scenario

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Data Insert Operation

1. **Data Arrival**
2. **Data Check**
3. **File Storage**
4. **Inventory/Metadata Update**

Data Server Subsystem
System Scenario

DATA SERVER SUBSYSTEM

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...HW

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Data Repository
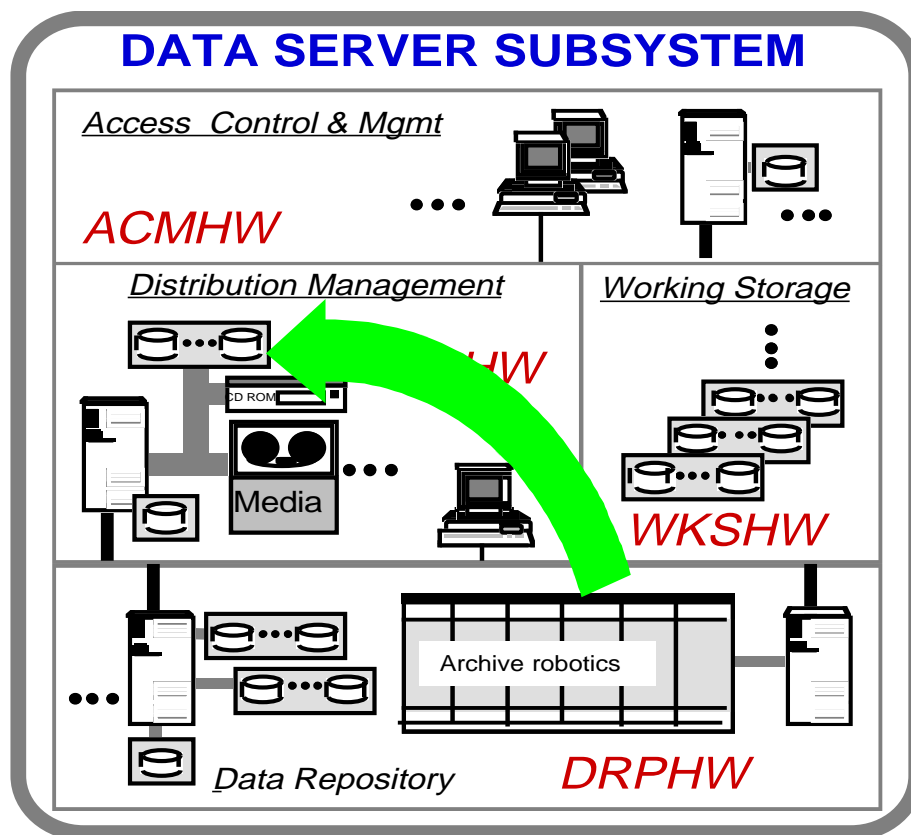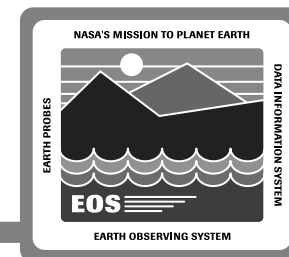
Physical Media Distribution

1 Same as Typical User Session

2 Media Generation Differs